BULLETIN

OF THE

NORTHEASTERN BIRD-BANDING ASSOCIATION

# FURTHER STUDIES OF PROTOCALLIPHORA INFESTING NESTLING BIRDS

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THE study of the blood-sucking larva fly *Protocalliphora* and its injury to nestling birds was continued this season (1927). Through the kind assistance of several friends interested in studying and banding birds, I have obtained much valuable data bearing on the subject.

On May 14th, Mr. J. D. Smith obtained at Needham, Massachusetts, fourteen larvæ of *Protocalliphora splendida* form *sialia* from a Bluebird nest. These pupated May 17th and 18th and on June 3rd two flies emerged, with six more on the following day. On May 31st Mr. Lester W. Smith reported three dead Bluebirds in a nest at Babson Park, Massachusetts. He brought in the nest, containing seventeen puparia, from which emerged, on June 11th and 12th, six specimens of *P. splendida* f. *sialia*. No parasitism of the pupa of the fly was observed in either case.

Mr. L. W. Smith was then called away, but on his return he and Mr. J. D. Smith collected all the abandoned nests of Bluebirds and Tree Swallows from the various nesting-boxes in Babson Park. These I numbered, and after the flies and parasites had emerged, I examined and counted the puparia in each nest. The nests were received July 6th, and while the flies had emerged in most cases, the puparia from which flies had emerged and those from which parasites had issued were readily separated.

Bluebird nest No. 1 contained twenty-two puparia from which flies emerged July 8th to 13th, forty-one puparia from which flies did not emerge, and sixty-seven puparia that were parasitized by the small chalcid *Mormoniella brevicornis*, a total of one hundred and thirty. This shows a parasitism of over 51%. This nest was also infested by a large number of fleas.

Bluebird nest No. 2 contained thirty-seven puparia from which flies had emerged, nine from which flies did not emerge, and twenty-one that were parasitized by the above named chalcid, a total of sixty-seven with a parasitism of 31%. A small tachinid fly, *Plectops pruinosa*, Mall. was in the jar. Whether it had parasitized a pupa of *Protocalliphora* I cannot say. Probably its host was some other insect that had entered the nest.

Bluebird nest No. 3 contained twenty-two puparia from which flies had emerged, three from which flies did not emerge, and twenty-five that were parasitized by the above mentioned chalcid, a parasitism of 50%. Two small tachinid flies appeared in the jar July 9 and one July 12th, the same species as in nest No. 2.

Bluebird nest No. 4 contained nine puparia from which flies had emerged, six from which flies did not emerge, and sixteen that were parasitized by the above mentioned chalcid, a total of thirty-one with a parasitism of 51%.

Bluebird nest No. 5. Three dead birds were in this nest and about one-half of the puparia were small, probably owing to the death of the birds having cut off the food-supply of the larvæ, or maggots. One small fly emerged. From eight puparia (six small) no flies emerged, and sixty-nine puparia (twenty-four small) were parasitized, a total of seven-eight, with a parasitism of 88%.

Tree Swallow nest No. 1. From the puparia in this nest there emerged from July 9th to 12th, eleven flies representing the same form as those frequenting the Bluebird nests, *P. splendida* f. *sialia*. From nineteen puparia no flies emerged and fifty-nine were parasitized by the same chalcid that was obtained from the puparia in the Bluebird nests. This nest shows a parasitism of over 65%. The nest also contained a number of fleas.

Tree Swallow nest No. 2. This nest contained a dead bird. From five puparia flies had emerged, from twelve of these flies did not emerge, and forty-nine parasitized, a total of sixty-six, showing a parasitism of over 78%.

Tree Swallow nest No. 3. Flies had emerged from only six of the fifty puparia and only five were parasitized.

Tree Swallow nest No. 4. One dead bird in box. From two puraria flies did not emerge and nine were parasitized.

One of the most interesting examples, representing a new host for the fly, was collected by Mr. A. W. Higgins, of Rock, Massachusetts, June 30th. In a letter he says: "The enclosed

criminals are guilty of murder; they caused the death of two young Crested Flycatchers. I make the count ninety-five [maggots] and lost several. Taken from a nesting-box, first brood." When I received the box July 5th most of the larvæ had pupated, and many had forced their way through the cloth covering the box, as I could count only seventy-one. On July 14th, twenty-four flies emerged, fourteen of which were males, and on the 15th, five (one male). From forty-two of the puparia, flies failed to emerge. No parasitism was noticed. I see no character that would separate these from the *P. splendida* f. *sialia* infesting the Bluebirds.

On July 19th Mr. Higgins sent me a Bluebird's nest taken at Rock, Massachusetts. Thirteen flies emerged from July 25th to 28th, from forty-eight of the puparia flies failed to emerge, and fifty were parasitized, showing a parasitism of 54%. This nest was alive with fleas, one hundred and forty being taken by actual count, while several escaped. The fleas increased in numbers after the nest was received.

The most interesting nest obtained was that of the Black-throated Blue Warbler (*Dendroica* c. *cærulescens*) from Ashland, N. H., collected by Mrs. Richard B. Harding. The flies were emerging when I received the nest, August 4th, and fifteen (six males and nine females) appeared that day, and on the 5th, nineteen (three males and sixteen females). One female emerged on the 9th. There were thirty-eight puparia in the nest with no evidence of parasitism. The flies from this nest were all typical *P. splendida*, and this fact seems to disprove sexual dichromatism, advanced by Shannon and Dobroscky (Journ. Washington Acad. Sci., vol. 17, p. 248, 1921) or at least confutes its constancy. While the pollinose covering on the thorax is less evident in the male than in the female, the abdomen in both are alike, blush pollinose, with the last segment coppery. This may, however, be only a local phase of this widely distributed species.

A letter dated May 26th from Miss Helen J. Robinson, of Brewer, Maine, reports the death of nestling Bluebirds. A week later Miss Robinson sent me the nest, but not all of it. The result was only one of the common blue-bottle flies, *Calliphora vomitoria* var. *nigribarbis*, a secondary fly, attracted by the dead birds. The maggots of *Protocalliphora* go to the very base of the nest to pupate, and it is therefore necessary to secure the entire nest and even the loose material in which it is built, to obtain all of the larvæ or pupæ. Later Miss Robinson wrote: "I found a family of young Tree Swallows

in a natural tree cavity in my neighbor's orchard. When I went to band them they were all dead in the nest. I suppose the *Protocalliphora* had been at work, but it was next to impossible to get at the nest and debris."

Under date of July 14th, I received a letter from Mr. Edward H. Forbush containing two pressed larvæ of *Protocalliphora* taken from a bird-box in North Middleboro, Massachusetts. There were two dead Bluebirds in the nest and many fleas.

With the above facts at hand, the question is: are these flies increasing? It seems to me that the records are not sufficient to prove that they are. Although common in the nests of birds, the fly is rarely taken in the field, on flowers, or by sweeping, as many of the other muscids are, so that little knowledge can be gained as to their abundance in the past from the various collections. W. H. Henshaw reported in 1908 that seven of the eight nestling Bluebirds in two successive broods at Wellesley Hills, Massachusetts, were destroyed by this fly, but little attention was paid to the matter in this section until last year.

Thanks to some of the members of the Northeastern Bird-Banding Association, we are now realizing the importance of a more thorough study of this fly. Watching the nestling birds so as to be able to band them as they are leaving the nest, they have discovered this enormous mortality which otherwise would have been overlooked, for the tendency in the past has been not to disturb the nests or to distress the parent birds.

Mr. Lester W. Smith says that at least 80% of the nestling Bluebirds and Tree Swallows have been destroyed this season at Babson Park, Massachusetts, and the above data seem to indicate that the larvæ of this fly is responsible.

There are many things to take into consideration in connection with a study of this fly. To what extent is the fly usually parasitized, and is the number of parasites this year below the normal? A parasitism of about 80% is usually deemed necessary to keep an injurious insect under control. The above figures show only two cases where the percentage approaches that figure. Can this be the cause of the increase of this fly. Most of the nests here recorded were taken from bird-houses. Are these more seriously infested by the larvæ of this fly, and the parasites less effective than in nests in cavities in trees? A hollow tree or limb is often damper than a bird-house, thus offering better condition for many pre-

daceous insects that may possibly feed on the larvæ of this fly. Are the flies more abundant during a cool, wet summer than during a warm, dry summer? June this year was cold and wet. Did this have a tendency to lessen the vitality of the nestlings, making them more susceptible to injury from the maggots and thus increasing the mortality? To what extent are the nests of Starlings infested by this fly, and is there a possibility that this introduced bird is causing an increase in this fly?

The only thing that I can suggest at present to check the increase of this fly is to thoroughly clean the bird-houses after the nestlings have flown and burn the contents. This should be done especially after the first brood, when there is little or no parasitism of the puparia. After the second brood it is probably best not to disturb the nest until the parasites have emerged, as it is this parasite, undoubtedly, which at times keeps this fly under control. Take for example Bluebird nest No. 5 with sixty-nine pupæ that were parasitized. Last year I counted the parasites and found that about twelve issued from each pupa. This would make over eight hundred that issue from the sixty-nine pupæ.

Not being attracted, apparently, by either sweets or carrion, as many of the other muscids are, no bait to attract the flies can be suggested. The females apparently hibernate, probably in hollow trees and other sheltered places, and in the spring deposit their eggs in the nests of birds. As many of the birds are double-brooded, there are also two generations of flies. That the larvæ of the flies are more abundant in the nests of the second broods than in the first is shown by comparing the Bluebird nests collected in May with those taken in July. The nest taken May 14th contained fourteen larvæ, and that of May 31st, seventeen. On the other hand, Bluebird nest No. 1, taken July 6th, contained one hundred and thirty and the nest collected by Mr. A. W. Higgins, at Rock, Massachusetts, July 21, 1926, contained one hundred and fifty-four larvæ. Another interesting feature is that the parasites of the fly were apparently absent in the first broods in the nests taken May 14th and 31st, but in Bluebird nests Nos. 1 to 5 there was a parasitism of from 31 to 88%, an average of about 60%. This being about 30% below what is required to keep under control an injurious insect may account for the abundance of this fly.

I here wish to extend my sincere thanks to all who have aided in furnishing material for this paper, and trust by

further cooperation we may be able to obtain more knowledge of the life-history of this great enemy of our nestling birds, thereby enabling us to adopt feasible methods for its control.

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## NOTES ON THE PRENUPTIAL MOULT OF THE TREE SPARROW

BY WENDELL P. SMITH

For several years Tree Sparrows (*Spizella m. monticola*) have wintered at Wells River, Vermont, visiting my station frequently from the time of their arrival in December to the time of their departure in April. Until the melting of the snow in March, the species is with rare exceptions a daily visitor, spending much time in the station area; but with the exposure of the ground, new sources of food-supply are doubtless uncovered, rivalling in attractiveness that supplied in the traps. This results in somewhat lessened frequency and much less time spent at the station.

Another difficulty hampering consecutive observation is the ability of some individuals to find their way out through the funnels of the sparrow trap, coupled with an avoidance of other types of traps.

These records cover a period of three years and deal with thirty-one individuals, but owning to the foregoing reasons, and perhaps others, they are fragmentary. In but one individual (No. 127125) has the process of moult been followed from inception to completion, and in that case daily observations were impossible, so there are many gaps in the record. Nevertheless, these records, despite their incompleteness, may have some value.

Dwight in "The Sequence of Plumages and Moults of the Passerine Birds of New York", p. 198, says of the prenuptial plumage changes of the Tree Sparrow: "First nuptial plumage [and adult nuptial plumage] acquired by wear, the buff edgings of back becoming grayish and the chestnut everywhere slightly paler." New feathers regularly grow on the chin in March, but apparently not in other tracts, and their appearance indicates, as in some other species, additions rather than moult, for they are few in number.

On March 5, 1927, in examining No. 127125, a "repeat", I found one active follicle on the chin. This individual was not taken again until March 22d, when a great many functioning